AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A magnetic recording medium comprising a non-magnetic substrate, an orientation-determining layer, a non-magnetic undercoat layer, a magnetic layer, and a protective layer, in order, wherein:

the non-magnetic undercoat layer has a bcc structure;

the orientation-determining layer causes the non-magnetic undercoat layer to have a predominant orientation plane of (200) and has a crystal structure in which columnar ~~fine~~ crystal grains are inclined in a radial direction;

the ratio of a coercive force in a circumferential direction of the magnetic layer (Hcc) to a coercive force in a radial direction of the magnetic layer (Hcr) is more than 1;

and the magnetic layer includes a plurality of magnetic films having an hcp structure and a predominant orientation plane of (110), and permits antiferromagnetic bonding to be formed therebetween.

2. (original): A magnetic recording medium according to claim 1, wherein the magnetic layer has a laminated ferrimagnetic structure in which the directions of the magnetic moments of adjacent magnetic films are opposite to each other.

3. (original): A magnetic recording medium according to claim 1, wherein the magnetic layer has a structure including a plurality of magnetic films and an intermediate film provided therebetween.

4. (original): A magnetic recording medium according to claim 1, wherein the magnetic layer has two or more laminated structures, each including a magnetic film and an intermediate film adjacent thereto.

5. (original): A magnetic recording medium according to claim 1, wherein, among the plurality of magnetic films, a magnetic film adjacent to a primary magnetic film having the largest coercive force has an antiferromagnetic bonding magnetic field larger than the coercive force of the magnetic film adjacent to the primary magnetic film.

6. (original): A magnetic recording medium according to claim 2, wherein the intermediate film comprises a material predominantly containing at least one element selected from the group consisting of Ru, Cr, Ir, Rh, Mo, Cu, Co, Re, and V.

7. (original): A magnetic recording medium according to claim 1, wherein the orientation-determining layer comprises one or more elements selected from the group consisting of Cr, V, Nb, Mo, W, and Ta.

8. (original): A magnetic recording medium according to claim 1, wherein the orientation-determining layer comprises an alloy predominantly containing Cr.

9. (original): A magnetic recording medium according to claim 1, wherein the orientation-determining layer predominantly comprises a Ta-containing alloy X_1Ta, wherein X_1

is one or more elements selected from the group consisting of Be, Co, Cr, Fe, Nb, Ni, V, Zn, and Zr, and has a Fd3m structure or an amorphous structure.

10. (original): A magnetic recording medium according to claim 1, wherein the orientation-determining layer predominantly comprises an Nb-containing alloy X_2Nb, wherein X_2 is one or more elements selected from the group consisting of Be, Co, Cr, Fe, Ni, Ta, V, Zn, and Zr, and has a Fd3m structure or an amorphous structure.

11. (original): A magnetic recording medium according to claim 1, wherein the orientation-determining layer predominantly comprises CoTa, wherein the Ta content is 30-75 at % or CoNb wherein the Nb content is 30-75 at %, and has a Fd3m structure or an amorphous structure.

12. (currently amended): A magnetic recording medium according to claim 1, wherein the orientation-determining layer predominantly comprises CrTa wherein the Ta ~~contentis~~ content is 15-75 at % or CrNb wherein the Nb contentis 15-75 at %.

13. (currently amended): A magnetic recording medium according to claim 1, wherein the orientation-determining layer predominantly comprises NiTa wherein ~~theTa contentis~~ the Ta content is 30-75 at % or NiNb wherein the Nb ~~contentis~~ content is 30-75 at %, and has a Fd3m structure or an amorphous structure.

14. (original): A magnetic recording medium according to claim 1, wherein the orientation-determining layer comprises a non-magnetic metal having a Fd3m structure.

15. (original): A magnetic recording medium according to claim 1 or 2, wherein the orientation-determining layer comprises a non-magnetic metal having a C15 structure.

16. (original): A magnetic recording medium according to claim 1, wherein an orientation-enhancing layer is formed between the non-magnetic substrate and the orientation-determining layer.

17. (original): A magnetic recording medium according to claim 16, wherein the orientation-enhancing layer comprises a material having a B2 structure or an amorphous structure.

18. (original): A magnetic recording medium according to claim 16, wherein the orientation-enhancing layer predominantly comprises any one selected from the group consisting of NiAl, FeAl, CoAl, CoZr, CoCrZr, and CoCrC.

19. (original): A magnetic recording medium according to claim 1, wherein a plurality of orientation-determining layers are provided.

20. (currently amended): A magnetic recording medium comprising a non-magnetic substrate, an orientation-determining layer for arranging the crystal orientation of a layer provided directly thereon, a magnetic layer, and a protective layer, in order, wherein:

the orientation-determining layer has a crystal structure in which columnar ~~fine~~ crystal grains are inclined in a radial direction;

the ratio of a coercive force in a circumferential direction of the magnetic layer (Hcc) to a coercive force in a radial direction of the magnetic layer (Hcr) is more than 1; and

the magnetic layer includes a plurality of magnetic films having an hcp structure and a predominant orientation plane of (110), and permits antiferromagnetic bonding to be formed therebetween.

21. (currently amended): A magnetic recording medium comprising a non-magnetic substrate, an orientation-determining layer for arranging the crystal orientation of a layer provided directly thereon, a non-magnetic undercoat layer, a magnetic layer, and a protective layer, the layers being formed on the substrate, wherein:

the non-magnetic undercoat layer has a bcc structure;

the orientation-determining layer is formed from an NiP alloy having an amorphous structure and has a crystal structure in which columnar crystal grains are inclinded in a radial direction of the substrate, and causes the non-magnetic undercoat layer to have a predominant orientation plane of (200);

the ratio of a coercive force in a circumferential direction of the magnetic layer (Hcc) to a coercive force in a radial direction of the magnetic layer (Hcr) is more than 1; and

the magnetic layer includes a plurality of magnetic films having an hcp structure and a predominant orientation plane of (110), and permits antiferromagnetic bonding to be formed therebetween.

22. (original): A magnetic recording medium according to claim 1, wherein the orientation-determining layer comprises nitrogen or oxygen in an amount of at least 1 at %.

23. (original): A magnetic recording medium according to claim 20, wherein the orientation-determining layer comprises nitrogen or oxygen in an amount of at least 1 at %.

24. (original): A magnetic recording medium according to claim 21, wherein the orientation-determining layer comprises nitrogen or oxygen in an amount of at least 1 at %.

25. (withdrawn): A process for producing a magnetic recording medium comprising a non-magnetic substrate, an orientation-determining layer for causing the non-magnetic undercoat layer to have a predominant orientation plane of (200), a non-magnetic undercoat layer, a magnetic layer, and a protective layer, in order, wherein the non-magnetic undercoat layer has a bcc structure; and the magnetic layer includes a plurality of magnetic films having an hcp structure and a predominant orientation plane of (110), and permits antiferromagnetic bonding to be formed therebetween, which process comprises:

releasing from a release source film formation particles containing a material constituting the orientation-determining layer to form the layer, and then

depositing the particles onto a deposition surface, wherein a direction of a trajectory of the film formation particles is controlled such that a projection line of the trajectory of the particles formed on the deposition surface lies substantially along a radial direction of a non-magnetic substrate, and such that an incident angle of the trajectory of the particles is 10-75° with respect to the non-magnetic substrate.

26. (withdrawn): A process for producing a magnetic recording medium according to claim 25, further comprising subjecting the orientation-determining layer to oxidation or nitridation.

27. (withdrawn): A process for producing a magnetic recording medium according to claim 25, wherein the orientation-determining layer is formed by sputtering using a sputtering target as a release source of film formation particles.

28. (withdrawn): A process for producing a magnetic recording medium according to claim 27, further comprising subjecting the orientation-determining layer to oxidation or nitridation using a sputtering gas containing oxygen or nitrogen while forming the orientation-determining layer.

29. (withdrawn): A process for producing a magnetic recording medium according to claim 26, wherein oxidation or nitridation is carried out by bringing the surface of the orientation-determining layer into contact with an oxygen-containing gas or a nitrogen-containing gas.

30. (withdrawn): An apparatus for producing a magnetic recording medium comprising a non-magnetic substrate, an orientation-determining layer for causing the non-magnetic undercoat layer to have a predominant orientation plane of (200), a non-magnetic undercoat layer, a magnetic layer, and a protective layer, in order, wherein the non-magnetic undercoat layer has a bcc structure; and the magnetic layer includes a plurality of magnetic films having an hcp structure and a predominant orientation plane of (110), and ~~permtis~~ permits antiferromagnetic bonding to be formed therebetween, which apparatus comprises:

a release source for releasing film formation particles containing a material constituting the orientation-determining layer; and means for controlling a direction of a trajectory of the film formation particles released from the release source, wherein:

the direction-controlling means controls the direction of the trajectory of the particles such that a projection line of the trajectory of the particles formed on a deposition surface lies

substantially along a radial direction of the non-magnetic substrate, and such that an incident angle of the trajectory of the particles is 10-75° with respect to the non-magnetic substrate.

31. (currently amended): A magnetic recording and reproducing apparatus comprising a magnetic recording medium, and a magnetic head for recording data onto the medium and reproducing the data therefrom, wherein:

the magnetic recording medium comprises a non-magnetic substrate, an orientation-determining layer for causing the non-magnetic undercoat layer to have a predominant orientation plane of (200), a non-magnetic undercoat layer, a magnetic layer, and a protective layer, in order, wherein the non-magnetic undercoat layer has a bcc structure; the orientation-determining layer has a crystal structure in which columnar ~~fine~~ crystal grains are inclined in a radial direction; the ratio of a coercive force in a circumferential direction of the magnetic layer (Hcc) to a coercive force in a radial direction of the magnetic layer (Hcr); is more than 1; and the magnetic layer includes a plurality of magnetic films having an hcp structure and a predominant orientation plane of (110), and permits antiferromagnetic bonding to be formed therebetween.